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who has hypnotized him, will be, as a rule, absolutely obtuse to the most direct of suggestions given by any other person. *Rapport*, although not an inevitable, is perhaps one of the most constant traits of heightened suggestibility, and this Dr. Sidis' second law ignores. Furthermore, it puts in an inverse relation traits that usually vary directly.

In his theory of the 'subwaking self,' Dr. Sidis takes ground between Myers and Pierre Janet. With Myers he holds that the subwaking self is a normal constituent of every human being and is not merely a 'disaggregation phenomenon.' With Pierre Janet he denies to it personality and self-consciousness, save in rare cases, and describes it as a congeries of ill coordinated, extremely suggestible, dream-like states. He further concludes that it is possessed of acute senses, but lacks sense and all power of criticism, is servile, cowardly, devoid of morality and of the power of willing. The relation between the primary and secondary selves is not clearly defined. Intercommunication exists, however, to some extent, and the phenomena of hypnosis, suggestibility, automatism, amnesia, insanity and of crowd and mob psychology are ascribed to a dissociation between the two selves whereby the inhibition of the primary is removed and the peculiar traits of the secondary are allowed to come to light.

To frame his physiological theory, Dr. Sidis simply substitutes for his 'moments content,' or psychic element, the nerve-cell, for association, contact of terminal filaments, for dissociation retraction of the terminal filaments and consequent loss of contact. Quite apart from the doubt cast upon 'no-anastomosis-but-approximation-only' theory by the recent publication of Apáthy's work, there never has been any physiological evidence for the theory which Dr. Sidis adopts. It rests solely upon anatomical observations and should not be put forward without due recognition of its speculative character.

But if Dr. Sidis' passion for logical clearness and exact formulation has betrayed him into making generalizations upon insufficient data, it has none the less made his book the more interesting. Even where the daring of his state-

ments challenges dissent, one cannot but feel sympathy for these bold attempts to introduce order into chaos, and for the scientific enthusiasm which inspired them. Attention should also be called to the interesting case of amnesia of which a brief account is given in Chapter XXII. and to the even more interesting series of experiments upon subconscious perception.

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Erkenntnistheoretische Grundzüge der Naturwissenschaften und ihre Beziehungen zum Geistesleben der Gegenwart. P. VOLKMANN. Leipzig, Teubner. Pp. xii+181.

Étude critique du matérialisme et du spiritualisme par la physique expérimentale. RAOUL PICTET. Geneva, Georg & Co. Pp. xix + 596.

Readers of SCIENCE who see also the columns of *Nature* may remember that the former of the above-named books was made not long ago the occasion of a rather sharp polemic by Dr. Karl Pearson on 'the departing glory of German science.' Now it may well be that Dr. Pearson's extended reading justifies his contention of the decadence of science in Germany, but certainly his illustrative examples were hardly well chosen. The *Grundzüge* is not a great book. It may even be one of a class of books not worth writing—an attempt to explain and to justify to a popular audience the scientific movement of the time. The critic justly charges the book with vagueness; with incompleteness; with failure in a labored effort to distinguish between certain scientific terms, as law, rule, principle, hypothesis; and especially with pushing too far loose analogies drawn from natural science and applied to other fields of thought.

But he is particularly severe upon Professor Volkmann for not seeming to have clear vision of the truth that all so-called natural laws are simply laws of the mind. Now the fact is that the book before us is as emphatic as Dr. Pearson himself could be in declaring that scientific laws are always and everywhere, like those of mathematics, constructions of the mind; only the author adds, these constructions *must conform to experience*. See p. 57, etc.

But the criticism is mainly unsatisfactory in

that it does not contain a single allusion to the main purpose or the principal thesis of the book reviewed.

The purpose of the book is to teach liberality of mind. The author summons us to look at every question from many points of view, to learn a wise reserve of judgment and opinion and to grant that there may be much in a subject which we do not know and which may yet be important.

The thesis of the book is that the natural sciences are especially adapted to secure this type of mind. The sciences of nature are not opposed to the sciences of the soul, but should form a whole with them and, through education, penetrate more deeply into the spiritual life of the present time. They are the productive, as the historico-psychological sciences are the reproductive, sciences and form the real motive power of our civilization.

In particular they are adapted to this end by at once stimulating and giving balance to what he terms the *isolating* and the *superposing* habit of mind. What does he mean?

How shall the mind deal with its cerebral baggage, its chaos of sense impressions and experiences? It may consider these mental presentations from a single point of view, rationalize them and build them into a complete and final system, or it may, *in accordance with the interest of the hour*, combine and recombine them and ever hold these constructions open for new material and fresh types.

So the contrasted terms '*Isolation*' and '*Superposition*,' familiar in the principle of the parallelogram of forces, vector analysis and the like, already extended in their application by Boltzmann and others (Wiedemann's *Annalen*, 57, p. 45, 1896), are here made to occupy a central place in the theory of knowledge (pp. 123, 130, etc.).

In education the '*isolating*' habit should predominate. Here the great purpose is to form the will, and for this purpose nothing is so well adapted as prolonged attention to some congenial subject from a single point of view. The aim is, through concentration of attention and effort, to secure unity of effect. And this habit of mind will always be useful, especially in art, religion and manners.

But with this ideal of a closed culture, a complete system, a final view of the world and of life, young people would go out into the world children, intolerant, quick in contradiction, unable to see a subject from more than one point of view, judging everything by their narrow system or their personal experience (p. 145).

But education, and particularly scientific education, has another side. It is continually bringing new fields of experience to bear upon and modify the old. Especially in advanced education the man learns to value that which is *essential to the purpose in hand* and to care less about the universal, the complete and the systematic. Every man is continually coming into a new world of interests and activities, and a part of the '*fitness*' which secures '*survival*' and prosperity is the ability to adjust himself to these changes. A large part of the book, which as a whole consists of detached popular papers and lectures, is made up of examples of these two habits of mind in science and in life.

As would easily be inferred, the author warns us against making too much of the atomistic philosophy. Monism he discredits as being a closed system, a final view. Materialism finds no favor in his eyes for the same reason. '*Science is neither materialistic nor idealistic.*'

The second book named above is at once the more interesting and the more important, but a synopsis of it is impossible, as it is itself a synopsis of the whole field of science in the interest of a spiritualistic philosophy. The author, Raoul Pictet, is well known by his early work in the liquefaction of gases. He, too, aims to be useful, especially to educated young men, whom he finds everywhere burdened with doubt, embarrassed by a philosophy of negation, believing nothing, hoping nothing, ready to abdicate personality.

The source of the malady he finds in a prevalent materialism which these young men suppose that science has somehow established. So he writes some 600 vigorous, entertaining pages to show that the materialistic position has not been proved; that, in fact, science disowns it.

The questions: Is man a machine? Is he free? bring us to the physical question: Can all

motion, all change, all intelligence, all feeling, be explained by the impact of matter upon matter or of matter upon ether? This question he pursues relentlessly into the remotest corners of the sciences of nature and man, answering it everywhere with an emphatic No.

But the argument is not wholly negative. The author would prove on the basis of experimental science that there is something in our universe beside matter in motion as the result of impact. Science deals with the question, How; Why and What are matters of taste and intellectual insight? Asking how matter moves, science arrives at the doctrine of the *potential*, gravitational, electric, magnetic, functional, intellectual, etc. The doctrine of the potential is utterly irreconcilable with the materialistic position (pp. 175 to 396).

Of course, much of this matter must be commonplace, as in any systematic exposition, but the recent and the recondite are not neglected, and the author's own researches are freely alluded to and given more fully in the appendices.

The book has a charming vivacity and is full of examples of felicity of statement and diction. It is also rich in anecdote and illustration. Many who would care nothing for the argument of the book would find pleasure in the account of Ampère's experiment (p. 100), of the synthetic free man (p. 355), of the materialistic explanation of whim and fashion (p. 361), of the encounter with a mob (p. 400), and the assassination of Paul I. of Russia (p. 416).

E. A. STRONG.

The Meaning of Education. By DR. NICHOLAS MURRAY BUTLER. The Macmillan Company. Pp. 230. Price, \$1.

This book is not a systematic work upon only a single subject; its seven chapters, instead, are mainly addresses that have been delivered in different parts of the country on various themes.

But the subjects chosen are leading questions in modern education; one is the American College and University, two pertain to the secondary school, and the four others involve particularly the aim of education, the characteristics of the new education, the relative values of studies and the relation of evolution to education. The selection of these topics indicates

the author's interest in all phases of education, and their treatment reveals his deep sympathy with modern views.

The book is likely to find an especially large number of readers, because it will appeal both to the educational expert and to teachers and citizens in general.

Its value to the specialist in pedagogy is due partly to the real newness of some of its thoughts, partly to their breadth of treatment.

For example, few teachers of method have seriously considered the relation of evolution to educational theory; to many, therefore, the first chapter, entitled the 'Meaning of Education,' will open up a new field of thought. Most of these specialists, also, devote their attention mainly to a very few phases of education; such as these Dr. Butler's wide interest and knowledge cannot help but broaden. There is hardly another man in the United States who has had an equal opportunity with him to acquaint himself with the condition of education in this country and abroad. Consequently his statements can rightly be regarded as authoritative. This fact lends great interest to the book, for Dr. Butler is not a man who fails to make concise statements that reveal the exact condition of affairs. For example, on p. 77 he declares, in substance, that most college professors know no more about the science of education than the motorman on a trolley car about the science of electricity—a statement that is certainly interesting and no doubt true.

Partly on account of the above facts, the book will prove of great value to teachers and citizens in general. Dr. Butler is peculiarly a man of the world; he is as well acquainted with the business man as with the teacher, and can make himself as fully understood and appreciated by the former as by the latter. Both will find in this book an outline, in brief, of the new education, but so simply and beautifully presented that, instead of taking offense at it because of its being the 'new education,' they are likely to regard it as entirely sensible. The book will, therefore, do much to establish sympathy among intelligent men and women for modern views on education.

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